

# Miguel Costas

Engineering Curriculum Vitae, updated November 26, 2018

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## Education

- 2011–2016 **PhD. in Civil Engineering, area of Continuum Mechanics and Structural Theory**, *School of Civil Engineering*, University of A Coruña.  
Doctoral thesis: *Crashworthiness analysis and design optimization of hybrid impact energy absorbers* Research stay at SIMLab (NTNU) during six months, granted by Fundación Barrié. Extraordinary PhD award, international mention and *cum laude* award.
- 2005–2010 **MEng. in Civil Engineering (Ingeniero de Caminos, Canales y Puertos)**, *School of Civil Engineering*, University of A Coruña.  
Number 11 of 95 in class. Erasmus exchange program at Syddansk Universitet (Odense, Denmark).
- 2005 **Professional degree in Music**, *Conservatory of Santiago de Compostela*.  
Specialization in piano and music analysis.

## Work history

- 2017–Present **Postdoctoral researcher**, *Centre for Advanced Structural Analysis (CASA)*, NTNU (Trondheim, Norway).
- 2016 **Postdoctoral researcher**, *Structural Mechanics group*, University of A Coruña.
- 2011–2015 **RD engineer and PhD candidate**, *Structural Mechanics group*, University of A Coruña.  
(Please find a list of RD projects on the upcoming pages).
- Summer 2009 **Internship**, *Port Authority of Vilagarcía de Arousa (Puertos del Estado)*.

## Teaching experience

- 2015–2018 **Teacher of “Advanced structural analysis” in the Master in Structural and Material Aerospace Engineering**, *School of Civil Engineering, UDC*.
- 2013–2014 **Assistant in the practical training of the subject ‘Bridges 1’**, *School of Civil Engineering, UDC*.

## Languages

- Spanish **Native**
- Galician **Native**
- English **Full professional proficiency, level C1** *Certificate in Advanced English, Cambridge University. 2012.*
- Norwegian **Intermediate professional proficiency, level B2-C1** *Currently studying at NTNU.*
- French **Basic professional proficiency, level B1**
- Portuguese **Basic professional proficiency**

## Computation skills

- Structural analysis Structural analysis with Abaqus Standard and Explicit. Experience in explicit crash simulations, including plasticity and failure models for metals and composites, contacts, joints, etc. Other software: LS-DYNA, Ansys, SAP2000, Cosmos/M.
- Optimization packages Experience in structural optimization with different optimization libraries. Experience with DAKOTA and LS-OPT optimization frameworks.
- CAD Autocad, Solidworks.
- Programming Python, Fortran, Bash, L<sup>A</sup>T<sub>E</sub>X.

## Other information

- Driving license. Car owner.
- Piano teacher and active professional concert pianist.

## Patents

- National Spanish patent no. ES 2-386-269-B1: Hybrid metal-composite system for crash energy absorption. Authors: Alberto Tielas, Isabel Álvarez, Raquel Ledo (Centro Tecnológico da Automoción de Galicia, CTAG); Miguel Costas, Luis Esteban Romera (University of A Coruña, UDC). Granted on the 11th of July 2013.

## Participation in RD projects

- [European project] FP7-AAT-2007-RTD-1. MAAXIMUS: More affordable Aircraft Structure through Extended, Integrated and Mature Numerical Sizing, UE, 03/2008-03/2013. Years 2011-2015. Budget: 370000 €.
- [National project] UNCL13-1E-2123. Boundary layer wind tunnel for civil and aeronautical engineering applications. Spanish Ministry of Economy and Competitiveness. Year 2014. Budget: 325000 €.
- [National project] DURAPORT. New technologies for the construction of durable port infrastructure. CDTI, program FEDER-INTERCONNECTA, Spanish Ministry of Economy and Competitiveness, ref. 407. Years 2011-2012. Budget: 40000 €.
- [National project] DPI 2013-41893-R. OPTOPAER. Probabilistic topologic and topometric optimization of aeronautical structures in linear and nonlinear regimes. Spanish Ministry of Economy and Competitiveness. Years 2014-2016. Budget: 53240 €.
- [Regional project] 09DPI-011118PR INCITE 2009. Optimum design of automobile structures and components with metallic and composite materials. Regional Counseling of Economy and Industry. Years 2009-2012. Budget: 45000 €.
- [Regional project] 10DPI025CT. Hybrid-Body: structural optimization of a hybrid sistem for frontal impact energy absorption with experimental and numerical validation. Regional Counseling of Economy and Industry. Years 2010-2012. Budget: 46000 €.
- [Regional project] GRC2013-056. Group of Competitive Reference. Regional Counseling of Culture, Education and Universities. Years 2013-2016. Budget: 259000 €.
- [RD project with industrial partner] With Puentes y Calzadas: Seismic design in linear and nonlinear regimes of the new bridge over the river Chiche, in Ecuador. Ref. 443. Year 2013. Budget: 44504.77 €.
- [RD project with industrial partner] With AIRBUS: Optimization study of rear fuselage. Year 2015. Budget: 25561.26 €.
- [RD project with industrial partner] With AIRBUS: Junction modeling of nonlinear frequency response of assembled structures. Extension of 2012 activities. Year 2015. Budget: 24200 €.

## RD fundraising

- [National project] DPI2016-76934-R. OPTISAFE. Probabilistic optimization of intact and damaged aeronautical structures under dynamic and impact loading. Spanish Ministry of Economy and Competitiveness. Year 2016. Budget: 111600 €.

## Publications

### Research articles in JCR journals.

M. Costas, D. Morin, O.S. Hopperstad, T. Børvik, and M. Langseth. A through-thickness damage regularisation scheme for shell elements subjected to severe bending and membrane deformations. *Journal of the Mechanics and Physics of Solids*, 2018.

M. Costas, D. Morin, M. Langseth, J. Díaz, and L. Romera. Static crushing of aluminium tubes filled with PET foam and a GFRP skeleton. Numerical modelling and multiobjective optimization. *International Journal of Mechanical Sciences*, 131-132:205 – 217, 2017.

M. Costas, D. Morin, M. Langseth, L. Romera, and J. Díaz. Axial crushing of aluminum extrusions filled with PET foam and GFRP. An experimental investigation. *Thin-Walled Structures*, 99:45–57, 2016.

J Paz, J Díaz, L Romera, and M Costas. Size and shape optimization of aluminum tubes with GFRP honeycomb reinforcements for crashworthy aircraft structures. *Composite Structures*, 133:499–507, 2015.

M. Cid Montoya, M. Costas, J. Díaz, L. E. Romera, and S. Hernández. A multi-objective reliability-based optimization of the crashworthiness of a metallic-GFRP impact absorber using hybrid approximations. *Structural and Multidisciplinary Optimization*, 52(4):827–843, 2015.

J. Paz, J. Díaz, L. Romera, and M. Costas. Crushing analysis and multi-objective crashworthiness optimization of GFRP honeycomb-filled energy absorption devices. *Finite Elements in Analysis and Design*, 91:30 – 39, 2014.

M. Costas, J. Díaz, L. Romera, and S. Hernández. A multi-objective surrogate-based optimization of the crashworthiness of a hybrid impact absorber. *International Journal of Mechanical Sciences*, 88:46–54, 2014.

M. Costas, J. Díaz, L. E. Romera, S. Hernández, and A. Tielas. Static and dynamic axial crushing analysis of car frontal impact hybrid absorbers. *International Journal of Impact Engineering*, 62:166–181, 2013.

#### International conferences.

J.K. Holmen, J. Johnsen, M. Costas, D. Morin, T. Berstad, T. Børvik, O.S. Hopperstad, and M. Langseth. Applications of \*MAT\_258: A through-thickness regularization model for shells. In *Dynamore Nordic Users' Conference 2018, Gothenburg (Sweden)*, 2018.

D. Morin, J.K. Holmen, J. Johnsen, M. Costas, T. Berstad, T. Børvik, O.S. Hopperstad, and M. Langseth. Theoretical aspects of \*MAT\_258: A through-thickness regularization model for shells. In *Dynamore Nordic Users' Conference 2018, Gothenburg (Sweden)*, 2018.

J. Díaz, L. E. Romera, M. Costas, and J. Paz. Reliability-based crashworthiness optimization of hybrid metal-composite energy absorption devices. In *ICCS19 - 19th International Conference on Composite Structures, Porto (Portugal)*, 2016.

L. Romera, L. Pire, M. Costas, J. Paz, J. Díaz, and S. Hernández. Improvement of crash forces in structures using optimization tools. In *HPSM/OPTI 2016, International Conference on High Performance and Optimum Design of Structures and Materials. Siena (Italy)*, 2016.

M. Costas, J. Díaz, L. E. Romera, D. Morin, and M. Langseth. Experimental characterization and numerical multi-objective optimization of the crashworthiness of aluminum extrusions filled with PET foam and GFRP. In *1st International Conference on Impact Loading of Structures and Materials (ICILSM), Turin (Italy)*, 2016.

J. Díaz, L. E. Romera, J. Paz, and M. Costas. Crashworthiness optimization of metal-composite energy absorption devices. In *ICCS18 - 18th International Conference on Composite Structures, Lisbon (Portugal)*, 2015.

L. Romera, M. Costas, J. Díaz, J. Paz, and S. Hernández. Reduction of the frontal crash peak forces in a car using size optimization tools. In *35th FISITA World Automotive Congress, Maastrich (Netherlands)*, 2014.

J. Díaz, M. Costas, L. Romera, J. Paz, and S. Hernández. Surrogate-based multi-objective optimization of glass-fiber - steel crash absorbers. In *35th FISITA World Automotive Congress, Maastrich (Netherlands)*, 2014.

L. Romera, S. Hernández, M. Costas, A. Balomir, and P. Ouro. Assessment of seismic behaviour of portal bridges with double friction pendulum bearings. In *7th IABSE Symposium, Madrid (Spain)*, 2014.

L. Romera, J. Paz, M. Costas, J. Díaz, and S. Hernández. Crashworthiness response of honeycomb metallic-GFRP energy absorption devices. In *HPSM/OPTI 2014, The 2014 International Conference on High Performance and Optimum Design of Structures and Materials*, 2014.

M. Costas, L. Romera, J. Díaz, S. Hernández, and A. Tielas. Computational and experimental analysis of a hybrid car impact absorber. In *Computational Methods and Experimental Measurements XVI, WIT Press, C.A. Brebbia, G. M. Carlomagno and S. Hernandez (eds.)*, pages 367–378, 2013.

M. Costas, J. Díaz, L. Romera, S. Hernández, and R. Ledo. Influence of welded joints on the crashworthiness response of hybrid structural elements. In *SAE 2013 World Congress and Exhibition, paper 13B-0036/2013-01-0755*, 2013.

#### International research stays

- Research stay from 1/10/2014 to 1/4/2015 (six months) at the Structural Impact Laboratory (NTNU, Norway) supervised by Prof. Magnus Langseth and Dr. David Morin.

#### Scientific advisory

- Reviewer in JCR journals *International Journal of Mechanical Sciences*, *Materials and Design*, *Journal of Reinforced Plastics and Composites*, *Engineering Optimization*, *Computers and Structures*, *Composites Part B*, *Thin-Walled Structures*, and *International Journal of Impact Engineering*.